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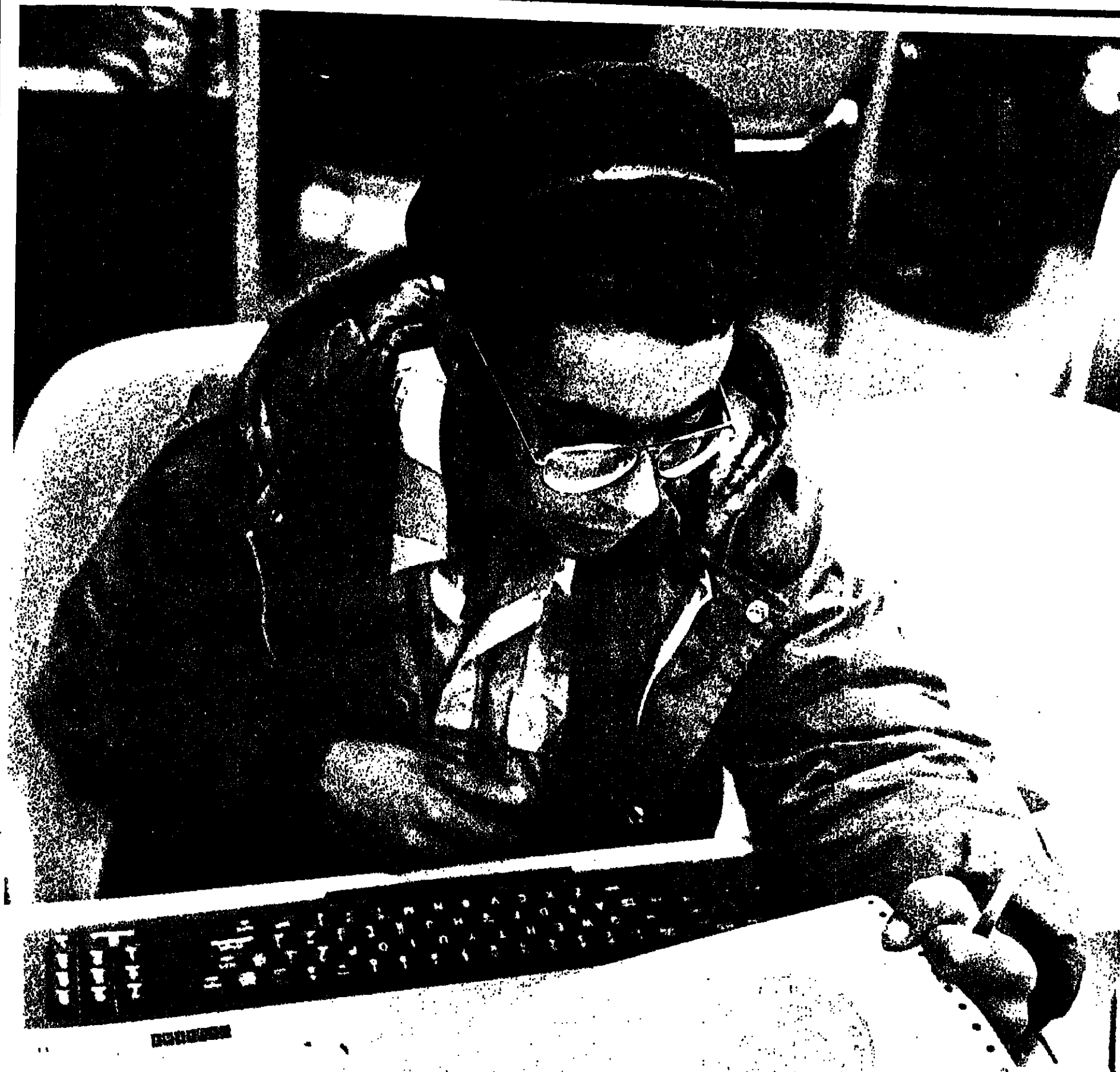
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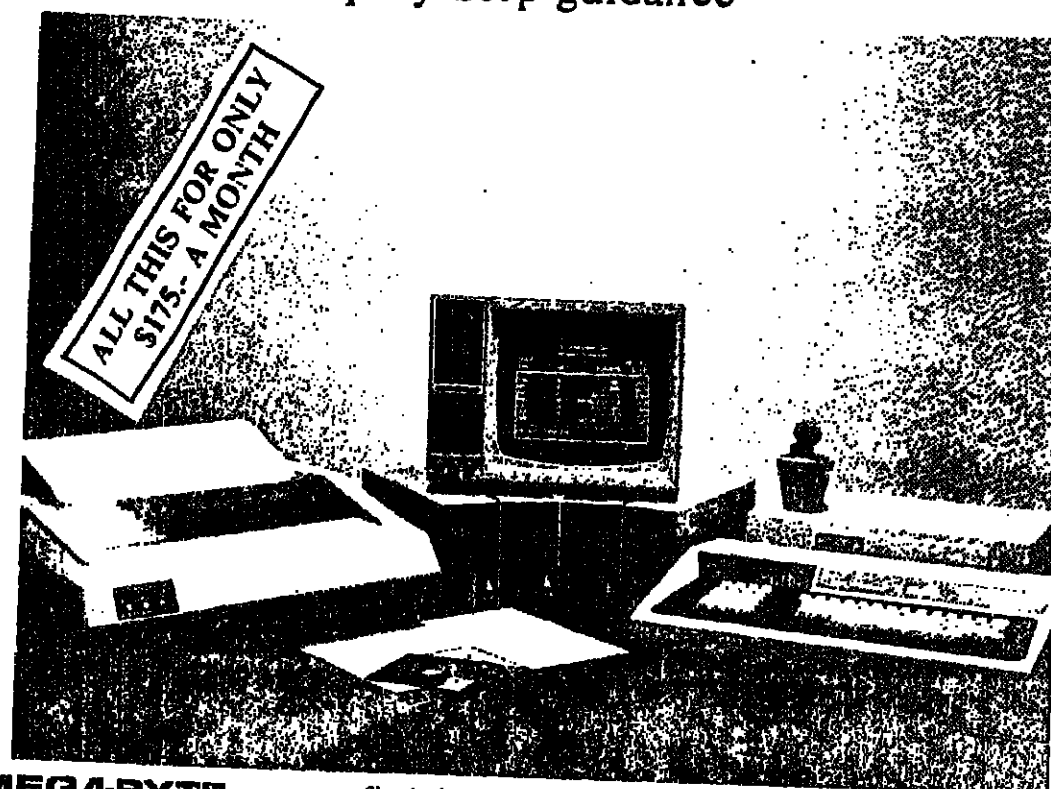
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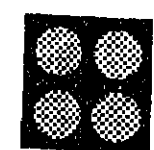
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MAN SEES himself as superior to the beasts in the field, as graven in God's image. But he may not be able to entertain this illusion much longer. Another creation, albeit man-made, shows signs of overtaking him: the computer.

It seems strange to compare an inanimate contraption with a living creature, for surely a computer can not think.

"It depends what you mean by thinking," says Philip Ein-Dor, who teaches business administration at Tel Aviv University. "A computer can play chess, which is an intellectual activity."

I scratch my chin. Perhaps playing chess is not creative thinking. "All right," he counters. "A computer can compose music. One of our students at the university is designing a computer to compose music in the style of Palestrina. Is that not creative?"

We ponder what the word "creative" means. Can a computer do what Shakespeare did — could it write *Hamlet*? Ein-Dor does not rule out the possibility. If we see the human brain like other parts of the body, as a physical organ, equipped with the special function of receiving information and processing it, the computer does much the same job.

What about the spontaneity, the unpredictability of the living spirit? The late Alan Turing suggested that to allow for that, a random element could be introduced into the computer's think-box, perhaps in the form of a roulette wheel.

That sounds cynical, but we mortals may not be as original as we think. *Hamlet* could have been the predictable result of "inputs" over an extended period of time, or what can be called Shakespeare's life-experience. The bard observed many things, and gave a condensed summary of certain conclusions in fictional form, through an extraordinarily felicitous choice of phrase.

A computer could conceivably do the same as the brain if we consider it a physical instrument for collecting, processing, storing and disseminating information.

If there is something beyond the physical in the human mind, something God-given or divine, man is still ahead of the machine. If the brain has ideas and insights that cannot be programmed — that derive from a source which is non-material and non-physical — then the computer will be unable to catch up. Man, in other words, may have a soul that is lacking in his automated creation.

These speculations are, of course, theoretical. Meanwhile, the computer, during the next 20 years, is going to do more and more of the things that man does — and do them more efficiently, more quickly and more reliably. And, it may do things that man cannot do at all because his brain is too small.

Before long, computers are going to have bigger "brains," that is, higher processing capacities, than man. That may qualify them, in Ein-Dor's view, to be the next step forward in the evolutionary process. "They may be a more advanced form of the species *homo sapiens*."

THE WAY computers work is not so complicated. Their innards consist of switches, each of which can be turned on and off. Each of them can say either "yes" or "no" or, alternatively, "one" or "nothing." There are an enormous number of such switches in a circuit. A pulse goes through them, indicating which is to go on and which to stay off.

# Machinations

Who's in control — man, or the machine he has created? To date, humans are still superior to computers, but the battle is very close, Tel Aviv University's Philip Ein-Dor tells The Post's Economic Correspondent David Krivine.



(David Rubinger)

We may be sceptical that "one" and "nothing" can yield so much information. But if we think of it, there are only ten digits in all our arithmetic, and look at what mathematics has done with those ten digits!

The computer employs two digits and is called a binary system. All numbers are translated into this system, which uses only "1" and "0." This is how it goes:

|          |            |
|----------|------------|
| 0 is 0   | 7 is 111   |
| 1 is 1   | 8 is 1000  |
| 2 is 10  | 9 is 1001  |
| 3 is 11  | 10 is 1010 |
| 4 is 100 | 11 is 1011 |
| 5 is 101 | 12 is 1100 |
| 6 is 110 |            |

And so on. 32 is 100,000. 64 is 1,000,000. Thus,  $4 + 5$  is 0100 + 0101, which equals 1001, which is 9; one way to multiply 7 by 6 is to add 7 to 7 six times.

There are three kinds of circuits — the "and" circuit, the "or" circuit and the "not" circuit. Two impulses are fed in, each of which can be either 1 or 0. The "and" circuit decides whether both impulses are 1. If they are not, it says 0; if they are, it says 1.

The "or" circuit decides whether one of the impulses is 1. If both are 0, it says 0; if either of them is 1, it

says 1. The "not" circuit receives a single impulse and turns it into its opposite. If the impulse is 1, it says 0; if 0, it says 1.

Using these three circuits in sequence, it is possible to build up any number of logical operations. And as time goes by, the chips on which these operations function become both smaller and cheaper.

At the beginning, the "on" and "off" impulses activated valves. But, valves took up room, they also burned out. Today the circuits are photographed, and the photograph, instead of being enlarged (like a successful snap of the family), is contracted to an almost infinitesimal size. Thus, circuits are now layers of "print," made up of chemicals embedded on silicon. Tens of thousands of such memory and logic units can be contained on a surface the size of the head of a pin.

The most familiar computer is the simple pocket-calculator which does additions, subtractions, multiplications and divisions at lightning speed. A more expensive calculator will do square-roots, logarithms and other computations, but, in Ein-Dor's opinion, it is still a primitive tool. It's not pre-programmed, he says. "To get the

answer, you have to press buttons on the calculator which is a terrible waste of time."

HE LIKES computers that can be programmed. Thus, hospital patients are wired to instruments which do part of the nurse's work. These devices monitor all the patient's vital signs — temperature, blood-pressure, heartbeat — and maintain constant supervision, checking that each one remains within acceptable limits. If one or other of these vital signs gets out of line, (e.g., the pulse-rate is too high), a signal draws the authorities' attention to the errant event.

A computer can likewise diagnose a patient's illness. Apprised of all the relevant medical information, it can tell you what the chances are that he has one or other of several possible ailments. The computer will even suggest what is the next test that should be applied in order to determine the nature of the illness.

Take weather forecasting. Channel the meteorological information into a computer and it works out a plausible forecast, promising a fair day, or perhaps overcast conditions, with half-an-hour of rain and then sunshine later in the afternoon.

A recent development in com-

puter technology that is already widespread and is going to become increasingly commonplace is robotics, or mobile computers. (The Talmud seems to have foreseen this creation, calling the end-product a *Golem*. The Kabbalist Moshe Cordovero thought that man could give the Golem activity, but not a *nefesh* or soul.)

The robot is used today mainly in factories. It locates pieces of work coming down the conveyor-belt — even if items are not evenly spaced or located in the same place — and it picks each one up. The robot then welds it or paints it, screws it into something, packs it into a box, takes it to a different part of the plant, or whatever.

A home-used computer "dressed up" with robotics can become a faithful domestic servant. One need only dictate the menu and the machine will do the rest. Connect it with a public communications network and it will book an order at the supermarket. Put it on wheels and it will cook a meal on the stove, or put clothes into the washing-machine, sorting out white linen from coloured. It can switch on the vacuum-cleaner.

And can a robot turn the central heating on and off according to the prevailing temperature outside. Ein-Dor grins: "A simple computer does that already; it is called the thermostat."

Computers keep accounts. Hook them up to the bank and they can pay outstanding bills. Home-security computers, available in the U.S., monitor break-ins, fires, screaming babies — and set off the appropriate alarm systems.

It should be possible to concentrate all the above functions in a single piece of equipment which will clean the house, cook the meal, do the laundry, control the heating, pay the bills and expose the burglar.

HOW FAR CAN ALL this computerization go — what are the limits? According to Philip Ein-Dor, it is impossible to say. Repetitive sorts of tasks are likely to be increasingly automated with time. Machines will replace men at jobs that require manual or mechanical dexterity.

It is not beyond reason to visualize robotic hairdressers, postmen (if mail-boxes are located according to plan), traffic policemen, train drivers, air pilots, tax collectors, shop assistants.

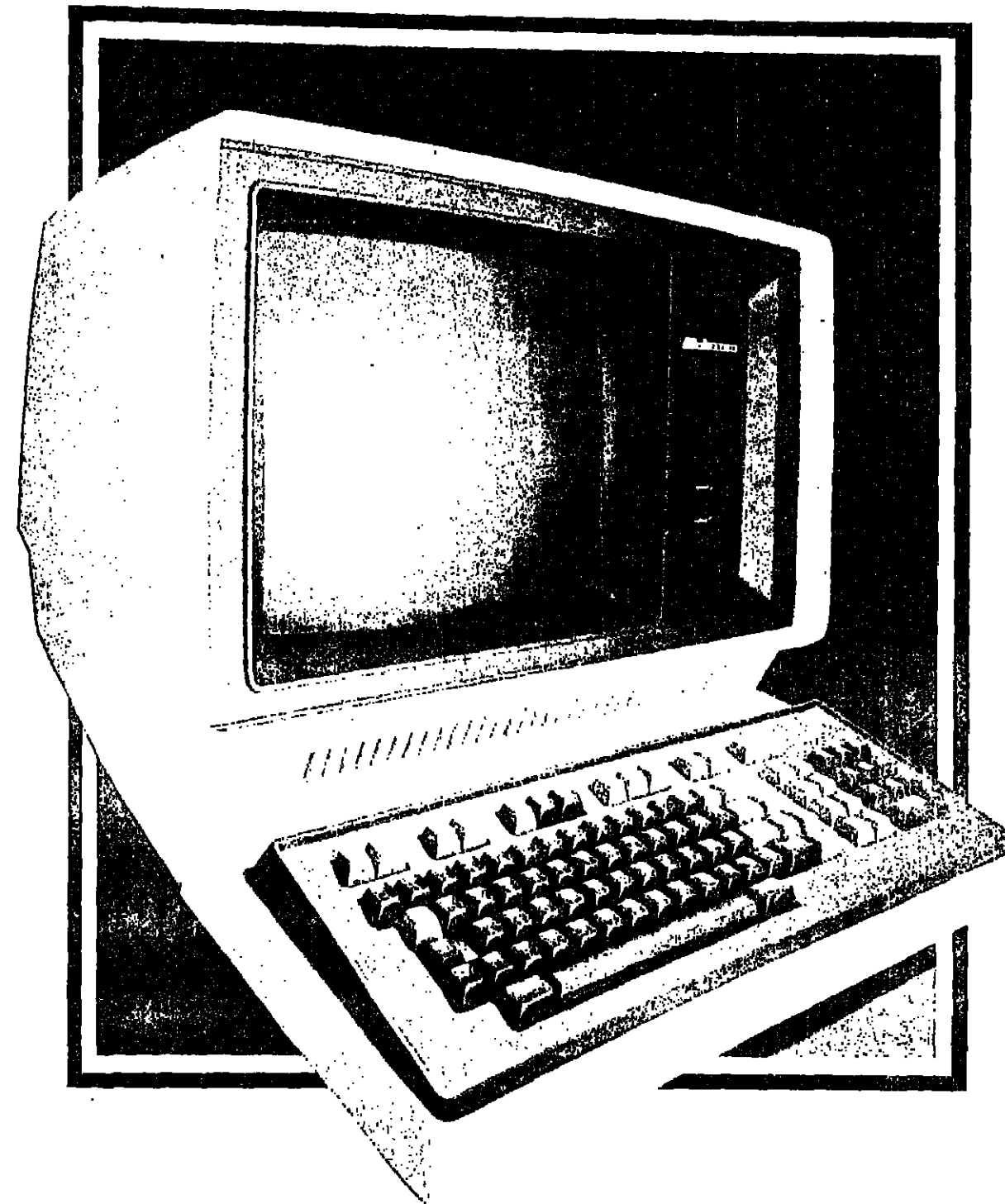
Human beings will have to focus more on specialized professional, technical and personal services. They will be teachers, entertainers, research workers, planners, but even these activities may be subject to inroads by man's latest competitor.

Trade unions will — not for the first time in history — start resisting the incursions of the machine into the realm of the human labourer. There are signs of that already. But the odds are weighted in the newcomers' favour: Robots do not eat or sleep or get tired, down tools or get sick.

The public, on the other hand, may become lazy if computers do everything for them. Who bothers to add up figures nowadays? Everybody has a little black box that does it better.

One expert warned that things may go too far. If these infernal contraptions become too advanced, laws may be passed to prevent the growing legion of *homunculi* from harming or damaging the wretched mortal beings who created them.

It could come to that. And before very long, too.



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**THE GROWTH** of the computer industry in Israel — even in the most conservative of terms — can only be described as phenomenal. This is especially apparent when one considers the increase in the number of computers in use in the country: In 1970, the number was mere 162 and by the end of 1980, the figure had risen by 900 per cent to 1,526.

Not only has the number of computers risen dramatically, but the number of establishments utilizing computers in the same period rose from 118 to 877.

The earliest efforts towards the production and manufacture of computers took place in the 1950s at the Weizmann Institute of Science. In 1951, Institute scientists completed work on Israel's first digital computer which was intended for scientific purposes. In 1960 scientists there began developing the Golem model, which was completed four years later and subsequently improved.

A major breakthrough in the field of computers in Israel was accomplished by Elbit Computers Ltd. of Haifa. The company's developers were able to design and produce a mini-computer. Then, based on their know-how, they proceeded to develop sophisticated military systems. In 1970, the U.S. Control Data Corporation (CDC) became a major partner in the company after it acquired the Elbit shares owned by the Israeli government.

Elbit made further progress in the computer field with its ANAT series introduced a couple of years ago. The ANAT's capabilities include batch-process, on-line transaction processing, and time sharing, and operates with software available from IBM and other companies.

More recently, Elbit entered into a manufacturing agreement with the well-known German firm, Nixdorf Computers. According to this agreement, Nixdorf was granted an exclusive seven-year licence to market the ANAT series in a couple of European countries. In the 1980/81 fiscal year, Elbit employed more than 1700 people of which some 10 per cent were active in research and development.

IT SHOULD BE pointed out that Israel, during the first 20 years of its existence, relied on the outside world for its supply of technologically based products. The situation changed drastically after

## Computer industry no Golem

Post Economic Reporter Joseph Morgenstern looks at the history of Israel's computer industry.



Wheels within wheels — computers at the Weizmann Institute

(David Rubinger)

the Six-Day War when France declared an embargo on not only the supply of Mirage jets, but on electronic equipment as well.

This was just the impetus Israel needed to establish new high-technology industries, many of which turned towards computer-related manufacturing. Also, in the post-1967 period, the government began to rethink its technology policy. It realized that there was a major gap between the technology potential in Israel and actual industrial output. To speed up development, the Office of the Chief Scientist was established with the purpose of encouraging industry to develop its own products while using local manpower.

While each ministry has its own office of the chief scientist, it is Professor Arie Lavie who is chief scientist of the Ministry of Industry and Trade which is most closely associated with the computer industry. Prof. Lavie's office is in position to make grants to 50 per cent or more of approved research and development projects in the country. According to the chief scientist, in 1980 Israel exported

nearly \$1 billion in high-technology from local research and development. Computers were a significant part of this figure.

Over the years, a number of Israeli concerns have achieved good reputations internationally with computer-associated products. These include Elta Electronics Industries. This company was established in 1962 and is a wholly-owned subsidiary of Israel Aircraft Industries. Nearly 2000 people work there, about half in research and development, and in the production of a variety of electronic equipment and systems for industrial and military applications.

Specifically, Elta produces military and industrial computer systems, and computerized radar and communication systems. One of these is a computer-based turn-key system (providing real-time, interactive on-line control of data-collection operations) which is designed to receive, validate and sort data of events as they occur in various locations in a plant. In the past year, Elta sales were in the order of \$85 million, half of which went for export.

Motorola Israel Ltd. has established a name for itself because of its irrigation systems based on computers and micro-processing. In 1981, the company exported approximately \$1.5m. in products. There are indications that export sales of the company's computer erection systems will expand rapidly over the next few years.

ANOTHER WELL-KNOWN company is the Sciex Company Ltd. This is acknowledged as being the world's leader in the production and sale of inter-active computer-aided design systems for pictorial and imaging applications. The company's sales in 1981 were in the order of \$35m. and a rapid rate of further growth has been predicted.

In the field of medical electronics, two companies stand out among all others. Elscint Ltd. which designs, manufactures and sells computer diagnostic equipment is regarded as one of the most advanced companies in the world in this area of high technology. The company's sales of its CAT scanner and of its nuclear imaging cameras should be in the order of

\$120m. during the 1981/82 fiscal year. Projections are that the company's annual sales may reach \$500m. some time in the next decade.

Patient monitoring and diagnostic computer equipment for intensive care and coronary care units have been developed by the Menem Medical Ltd. Company. At the end of the last fiscal year, one third of the company's staff of more than 170 was involved in research and development and the company exported well over \$3.5m. of its products.

Another area of successful application of computer technology is in the computer's numerical field. Here, computerized numerical consultant systems are interfaced to DC modems, which are mounted directly on machine tools so as to make operation of these machines completely automatic.

Calculations and monitoring operations are also carried out by computer. Some of the leaders in manufacturers in this field include Conlong, and Sharnoa Electronics Ltd. Computerized sewing systems for the fashion and clothing industries have been successfully completed by Beta Engineering and Developing Ltd. The company's sewing systems free the footwear and clothing manufacturer from the rising costs of human labour while simultaneously increasing production.

Israel, not unlike many other industrial countries, is faced with rising inflation. Many times industrial projects are abandoned due to high labour costs.

The answer to this problem may be found in the field of robotics where computer-controlled machinery replaces the activity of the industrial worker. At the Technion in Haifa, the possible industrial applications of robotics are being studied. The Technion has acquired a robot which it calls PUMA — a programmable universal manipulator and for assembly. The first major industrial research and development product in the field of robotics had been undertaken by Elco Ltd.

Israel's electronics industry as a whole, comprises some major companies. About 20 per cent of Israel's industrial engineers work in this industry, although this sector accounts for only 6 per cent of the industrial work force of the country. In 1980, the electronics industry contributed an estimated 9 per cent of Israel's total industrial export sales.

TIMNA systems within the same network.

SION — the Automatic Teller Machines (ATM) — are installed in the outside walls of bank branches as a do-it-yourself service for bank customers.

BY THE end of 1981, 29 bank branches were operating the SI system; 30 branches installed ATM systems; and two TIMNA systems operated in stocks and securities departments. At the United Mizrahi Bank, which is considered to be in the forefront of computerizing systems, the on-line use of the computer, besides the natural advantages that it offers to clients, has helped management in its planning and decision-making activities.

The trend to computerize banking services will undoubtedly continue in the foreseeable future, and it is more than likely that Israel will join the ranks in acquiring the most advanced systems found in the financial field anywhere in the world.

## Technical tactics

Israel is providing technological knowledge to the developing world in the form of computer usage. Dov Chevion, of the government's Office Mechanization Centre, talks to Betti Lipman.

There exists a substantial gap between computer usage in both developed and under-developed countries, according to Chevion.

"Under-developed" is a heterogeneous term, incorporating the more highly advanced countries of Latin America, as well as the southeast Asian countries of Nepal and Colombia, which lag far behind in their use of computers, Israel, he says, occupies a "middle position" between these nations and those of the First World.

The developing world is far behind in all aspects of computerization: applications; number of computers; use of telecommunications; quantity and quality of manpower. This situation necessitates immediate action in the transfer of computer technology.

But, Chevion cautions, there is a serious danger that if the transfer is not speedy, or recipient countries do not take their own initiative, computerization will merely lead to widening of the existing gap.

INTERNATIONAL cooperation in transfer of technology has long constituted a global problem, pur-

ticularly in the case of computer technology. On the one hand, computers comprise the most international field of technology; on the other, its applications are of an inherently national character and have to be adapted, in each individual case, to the environmental and cultural conditions of the recipient country.

When an under-developed country, desiring to move forward, blindly imitates more technologically advanced countries, there will be no progress, only regression and frustration, says Chevion. There must exist in the recipient country a basic infrastructure in organization and technology for new technology to be beneficial. Above all, there must be qualified manpower, skilled in the use of this technology. If any of these factors are substantially lacking, the movement towards computerization is futile and even counterproductive — hampering development and creating false illusions.

Those countries now only approaching computerization, can reach the level of their more advanced "assistants" faster by

preparing their infrastructure towards this technology, applying the lessons learned from those who have preceded them, according to Chevion.

Truly successful transfer of computer technology — which depends on affinity between the partners in cultural customs and mentality, as well as proximity in the level of development — is not effected by the most to the least technologically developed countries. Those countries that have been actively computer-oriented for only a decade or two, he stresses, and who acquired their skills by learning from the "veterans," can best assist the newcomers.

Israel stands as an example of "the middle of the ladder," with many characteristics shared by the developed countries on the one hand, and by the developing ones on the other. In particular, says Chevion, the "memory" of Israel's own developing stages is still fresh, thus enabling it to understand the situation of a country undergoing those phases. If, between the nation — such as Israel — which transfers knowledge and that which receives it, there exists affinity in thought, mutual understanding based on similar experience, and reciprocity of interest and activity, cooperation will result in maximal qualitative and quantitative progress.

WHAT, THEN, from its very special position, has Israel achieved in its efforts to transfer computer technology to less developed countries? Chevion is active as council member and vice president of the International Federation for

Information Processing (IFIP), working in close cooperation with MASHAV (the Division for International Cooperation of the Ministry for Foreign Affairs). This organization sponsors all activities associated with international cooperation — held both in Israel and abroad — and dispatches Israeli experts in all fields to train people in developing countries. Israel, he says, thus plays a big role in implementing a variety of cooperative activities, particularly relating to Latin American and Southeast Asian countries, such as: symposia; conferences; tutorial courses; advice in, and programmes for education and training. The aim here is not merely to pass on information, but to ensure the easy, mass transfer of that information, according to Chevion.

What are the benefits — to Israel — of such activities? From an idealistic viewpoint, they constitute a very real contribution to international cooperation, which gives the country prestige and may facilitate good relations in other fields, or lead to both political and economic advantage, since Israel is increasingly interested in exporting hardware and software, says Chevion.

The international relations established by Israel's computer community, he concludes, are of extreme relevance to the future and may balance out some of Israel's less successful relations in the international arena where, in spite of the difficulties it encounters, our nation's specific ability to contribute professionally is highly respected and should not be undervalued.

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## Computing one's assets

The trend towards computerizing banking services is growing rapidly, reports Joseph Morgenstern.

THE COMPUTERIZATION of banking transactions in Israel for many years has lagged behind the levels reached in Europe and the U.S. However, over the past few years, the country's commercial banks have made rapid strides in computerizing nearly every aspect of their services.

Securities orders received from various bank branches are now collated instantaneously, and the bank's master computer prepares the final listing for all buy and sell orders which are transmitted to the floor of the Tel Aviv Stock Exchange.

Foreign currency transactions are carried out and reported on the following day; a client today can walk into a foreign currency department of a bank and receive an instantaneous print-out showing the exact position and balance in his various foreign currency accounts.

An outstanding example of a service bureau which specializes in computer systems for commercial banks is Mehish Computer Services

Ltd. A subsidiary of the United Mizrahi Bank, Mehish employs nearly 300 people and offers its services to other banks (besides United Mizrahi), commercial companies, municipalities and government agencies. A high proportion of the staff consists of university graduates including system analysts and programmers.

The computers used by Mehish are considered as being among the most up-to-date in the world today. The company uses the IBM 3031 and also has two IBM 4341 models which operate in concert with one another.

Last year, Mehish installed at the United Mizrahi Bank three on-line data processing systems. The SI on-

line branch information system is used in providing information to the customer, as well as to those working on the operational level in stocks and securities and foreign exchange.

THE CLERKS' working station consists of a terminal and printer that help clients with: on-line query of the latest balance of account in real-time; retrieving transactions of an account since the last statement; ordering cheque books with the client's (printed) personal data supplied within 24 hours; executing financial transactions (withdrawals, cash and cheque deposits etc.), where all information required for the transaction is supplied by the

terminal. The system automatically sums up all transactions, according to their type, for the purpose of balancing accounts and counting cash.

The TIMNA, a stock and security information system, supplies current information about the rate of stocks, as reported from the stock exchange. The terminal is connected on-line to the stock exchange computer, allowing the customer to instruct the sale or purchase of stocks until minutes before trading begins at the Tel Aviv Stock Exchange.

The customer can obtain real-time, on-line information about any securities portfolio. This service is a result of integrating the SI and

TIMNA systems within the same network.

SION — the Automatic Teller Machines (ATM) — are installed in the outside walls of bank branches as a do-it-yourself service for bank customers.

BY THE end of 1981, 29 bank branches were operating the SI system; 30 branches installed ATM systems; and two TIMNA systems operated in stocks and securities departments. At the United Mizrahi Bank, which is considered to be in the forefront of computerizing systems, the on-line use of the computer, besides the natural advantages that it offers to clients, has helped management in its planning and decision-making activities.

The trend to computerize banking services will undoubtedly continue in the foreseeable future, and it is more than likely that Israel will join the ranks in acquiring the most advanced systems found in the financial field anywhere in the world.

VIDEO GAMES, that micro-chipped mania which has swept America, Europe and the Far East, have secured a firm foothold in the Holy Land, with every indication that Israelis too will turn into a nation of high-spending, mind-bending, Moonbase-defending vidiots.

Affluent owners of home video systems can purchase a wide variety of game cassettes ranging from sheshesh and chess to the more popular space-battle versions, at prices often topping \$55,000. But the masses get in on the action as well in the new coin-operated video-game parlours which have sprung up everywhere from the alleys of Jerusalem's Old City to the farthest development towns. Every village in the country these days seems to have its own village vidiots.

For the uninitiated, a video game is space-age technology applied to the principles of the pinball machine, the shooting gallery, and those pencil pastimes like Tic-Tac-Toe and Battleship which we used to play clandestinely during boring hours at school. The opponent in this case is a computer-programmed series of images that appear on a TV monitor, complete with raucous sound effects. The computer challenges your reflexes as it throws missiles at your moon colony or hurls grenades as your hero attempts to scale ladders and leap ravines. The brains of the game are in the micro-chips, those incredible wafers of minute circuitry which I cannot begin to understand and which I prefer to envision as tiny men in bowler hats running about manipulating everything in the world that lights up, buzzes, or barks me with depressing punctuality every month.

In any event, the video games are at least one answer to that old tiresome question of what sense there was in the U.S. diverting \$100 billion to NASA in the 1960s while the nation was losing the war on poverty. The blessed result for the common man today is that he can now play pencil games without lifting a pencil.

That's one criticism of video games. Another is that they are totally uncreative and even mind-numbing. A third is that they are an electronic narcotic which wrings increasing amounts of cash out of its addicts.

The answer to all that, of course, is that nearly everybody considers video games fun.

And good, clean, stimulating fun, insist Shalom Sagiv and David Sela, the two personable young sabras who less than two months ago opened the Galaxy Video Parlour at 85 Jaffa Road in the capital. In their office at the nearby Clal Centre, where they also sell home video games, they staunchly defended Space Defender and all those other forms of micro-chip mayhem.

"We have some fairly simple games, like Pacman," says Shalom, "and that doesn't demand too much mentally. But there are plenty of really challenging games as well. We've just put in one called Qix, and believe me, it really takes brains to keep up with that programme."

"It's nothing like pinball," David adds, "not mentally and not — most important — in terms of atmosphere. Our establishment at least is nothing like the pinball and billiard parlours you find elsewhere. This is part of what makes it good clean entertainment. You've seen our place — carpeting, wood paneling, no eating of gartum allowed. Everybody can come and have a good time."



## Village vidiots

Micro-chip mayhem is taking the Capital by storm, writes Madeline L. Kind. Aliza Auerbach took the pictures, at the Galaxy video parlour.

Who are Galaxy's customers? "Literally everybody," David says with pride. "High-school kids of course come by after school. Americans, very much so. But also local accountants and lawyers and other professionals. They come down from the Clal building in their lunch hour."

"And religious types, too," says Shalom. "Not the Mea Shearim people, but Habadnikim, for sure. They wouldn't have video systems in their homes, but they really like the games at the parlour. Some of those yeshiva students are very sharp players."

I mention that in a recent cover story on the video-game phenomenon Time magazine asserted that Israelis whip the games very easily, presumably because of their military training.

"Yes, I read that," David laughs. "Nonsense, of course." His partner agrees, but suggests that perhaps Israelis have a "sense of trickiness" that helps them beat the computer after a little practice.

Both partners admit that very few women play the games, a

phenomenon which has been noted abroad and which is attributed partly to the macho battlefield character of most of the games and partly to the association of game parlours with sleazy pool halls and seedy amusement arcades.

"Yes," says David, "there are such game parlours here which women would be afraid to enter." (See below) He continues: "And that's a pity. We'd like to encourage more girls to enjoy our place. We're thinking of maybe offering a free first game to give girls a chance to see what it's like."

"Equally bad is the law that prohibits people under age 16 from playing," David goes on, bridling. "We're licensed under the old 1946 British Mandate law governing billiard halls and gambling dens, and I think that's outrageous. There's no gambling involved in video games. You don't even win free games — you just get to play as long as your skill allows. Well, if young kids can play video games at home — and play well — why can't they play in public parlours?"

One answer to that is that sub-

teens tend to be the most easily addicted to video games, and have been known to hock the family silver to feed their habit. A video game at Galaxy, which is open from 10 a.m. to 10 p.m. (midnight on Saturday nights) costs IS6 a shot. While an especially good player can get a long ride for his shekels, the average player drops upwards of IS40 per visit. And many video junkies come back every day.

With 17 game monitors at a cost of \$3,000 to \$4,000 each, there is obviously a good deal of money tied up in Galaxy — and presumably a good deal to be made. In addition, Shalom and David and their backers buy new game programmes every few months and travel abroad to scout for the latest examples of the rapidly evolving video technology. David and Shalom are both licensed tour guides who still handle a little travel business on the side, but especially in this slack tourism period they have no regrets about getting into the video game.

I POPPED back downstairs to Jaffa Road and tried my hand at a few

games. All I could think while Pacman gobbled up a string of innocent red hearts was that Galaxy was gobbling up my shekels. Qix seemed to demand some knowledge of plane geometry and maybe trig, and as an algebra drop-out I promptly dropped out of that. Space Invaders blasted away at my space station or whatever it was with super-galactic ease, but I was rather rooting for the computer anyway, what with all its cute little flying saucers hovering around the mother ship. The interstellar sound effects sounded pleasingly like a good punk band tuning up.

Intrepid reporter that I am, I continued on down Jaffa Road and turned the corner to King George and Agrippas. There I descended into the bowels of the basement establishment known only as Pinball Games House.

This indeed was the sleazy sort of place David and Shalom had warned about. It was only 11 a.m. (the place is open from 8 a.m. to 11.45 p.m.), but already it had the atmosphere of an after-hours speakeasy. Army dubon was *de rigueur*, giving the place the feel of a guerrilla Shekem. The battle racket from 26 video-game monitors competed wildly with the ding-a-ding of pinball machines and the clack of snooker balls. The only apparent civilian in evidence was a drunk who looked like he'd gone underground in pre-statehood days and hadn't surfaced since.

But in fact two women were present — the change-makers over by the billiard tables. Aliza apparently suspected my press card was some sort of police cover and at first said I must talk only to owner Eli Levy, who was out at the moment. "I'm not permitted to give out any information," Aliza told me, unaccountably nervous.

She did divulge however that the cellar had had video games on the premises for about two months, that they went for IS4 per shot, and that they were "popular with the kind of people who like them."

The drunk leaning on my shoulder followed up that tautology with an offer to treat me to a game of Space Invaders. I zapped him in the micro-chips with my right missile-launcher and took off.

Over at the Tzameret Cafe in the Rasseco Tower the atmosphere was different from both the Galaxy and the pinball basement. The cafe features nine video-monitors built into table tops, with seating for four at each table. Two players can compete against each other in various games — the most popular here is Moonbase — while two companions can kibitz, stoke the contestants with beer and sandwiches, and otherwise try to maintain the lost art of conversation over the merry din of electronic warfare. Carpeting and slightly worn upholstered chairs make the Tzameret fairly cosy, while the space-monster posters on the walls keep the clientele's minds on the seriousness of the business at hand.

"Our games cost IS6 each," manager Mooli Hirschberg informed me, "but most people will spend several hours here. It's an evening's entertainment, instead of going to a movie. We've had the video games for about seven months — the first in the city — and the place jumps from 10 a.m. to midnight. Saturday night is our busiest night."

With room for only nine table monitors and the crowds clawing at the doors, Mooli would like to expand. "Everybody loves it, everybody has a good time. There's no doubt in my mind that video games are here to stay."

PERHAPS it's because Talmud study inculcates logical and ordered thinking, or because the computer field is flexible in regard to lifestyles.

Whatever the reason, Orthodox educational institutions in Israel have been among the pioneers in the use of computers for teaching and for technical services.

Boys Town in Jerusalem, the huge religious vocational school in the Bayit Vegan quarter, was the first school in the country to introduce computers eight years ago, according to Naftali Goldenberg, director of the educational computer centre at Boys Town.

On the other edge of that neighbourhood, the Jerusalem College for Women (Michlala) claims exclusivity as the only teachers' seminary with courses in teaching computers in its curriculum.

The Jerusalem College of Technology near the Michlala is known for its advanced computer courses on the college level, and many other religious schools — at the elementary and secondary level, including B'nai Akiva yeshivot — consider computers an integral part of their offerings.

Many of the founders of such computer programmes, as well as the teaching staff, are immigrants from the U.S. and other Western countries. Like the diamond industry, the computer industry offers a profession that is transferable and flexible enough for Orthodox Jews.

Although computers were viewed with suspicion at first by the very Orthodox members of the Boys Town staff, especially Old World-style rabbis, most of them have come to regard the machines in a more positive light says Goldenberg, a Technion graduate who has been at Boys Town for 16 years, half of them in the computers department.

"The computer is an instrument that serves you and saves time," he explains. "They don't even manufacture slide rules anymore — who remembers how to use them, now that pocket electronic calculators are everywhere? Technology can do routine work, while people are freed to be creative."

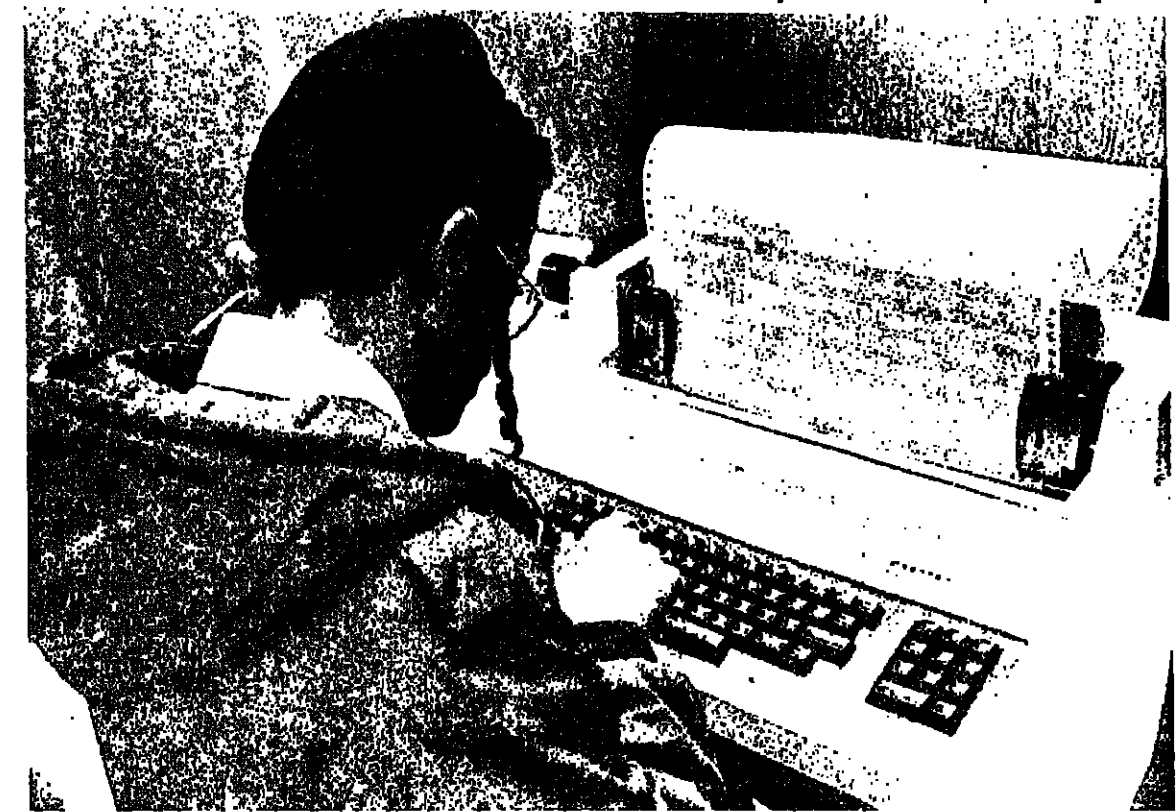
The Boys Town rabbis have "got used" to the idea that every week, all 1,400 pupils (seventh through 14th grade) at the school are tested on the Tora portion of the week by computer. A rabbi prepares the questions, and the computer shuffles the order of the questions in infinite variety to discourage copying. The pupils answer by marking a special sheet with pencils. By the end of the day, the computer has marked all the quizzes, and is able to provide a breakdown on which questions were the hardest and which teacher's pupils had the best or poorest marks.

The entire student body, whether they are enrolled in the practical engineering, carpentry, computer science or electronics sections, are accorded "computer literacy." Throughout the four-year high school curriculum, says Goldenberg, they get two hours of computer training per week.

Even for someone who will eventually make his living building cabinets, understanding of computers is important, according to the computer centre director. The computer revolution will mean as great a change in modern life as the automobile did at the beginning of the century. Computer language, he continues, will eventually resemble human language, and everyone will in the not too distant future have a

## Payyot and programming

Orthodox educational institutions are among the pioneers in the use of computers. Judy Siegel visits Boys Town and the Jerusalem College for Women. Photos by Isaiah Karlinsky.



computer at home — to do his banking business, shopping, research and the like.

In addition to basic literacy in computers, 250 pupils do their matriculation in computer science. The school's 32 computer terminals are used almost around the clock not only by computer students, but also pupils in the printing, mechanics and electronics departments. "The terminals are always warm and in action," says Goldenberg, "until about 1 a.m. The instruments are also used in extra-curricular activities."

Aside from such uses, computers are harnessed to teach English, as well as Tora subjects, through drill and practice. The computer asks questions and gives the students a few chances if they answer incorrectly. The progress of each boy, identified by number, is recorded and charted throughout his school career.

"Drill and practice in the Talmud is very important in creating order and providing a visual lesson, thanks to the computer," says one bearded young Talmud teacher at the school. "And the rabbis are forced to compete and be judged

according to the success of their students, because grades are printed out for all to see."

Teachers have learned how to use computers for making graphs and for teaching maths and physics as well. Using the new computer-aided design, the stuff at Boys Town hope to be able soon to plan electronic circuits with help from the computer.

The computers are of great help in producing inter-departmental mail (with help from word processors), students' and teachers' records and the like. Teachers can be assigned to classes without

overlapping schedules in a few minutes, instead of the old trial-and-error paper method. But the computer does not produce pay slips. "If we agreed to share it for such uses, we'd have no time for ourselves," says Goldenberg.

Computers require the staff and students to keep up constantly with advances in technology. Boys now entering Boys Town will go into the army and will only enter the outside world in 1990. Many changes will take place by then, says the centre director. "We try to give them a sound basis so they can easily pick it up when they start earning a living."

BY COMPARISON, computer equipment at the Jerusalem College for Women is much less sophisticated and extensive than at Boys Town. But, by being the only seminary with such technology, it remains unique. One hundred of the 700 students are enrolled in computer classes — for a degree in applied engineering or for computer programming — in addition to their extensive religious studies and their teachers' certification courses.

"About half of the students eventually go into teaching that doesn't involve computers, and the rest work in public and private markets as systems analysts and programmers," says Yitzhak Isaac, acting chairman of the computer department.

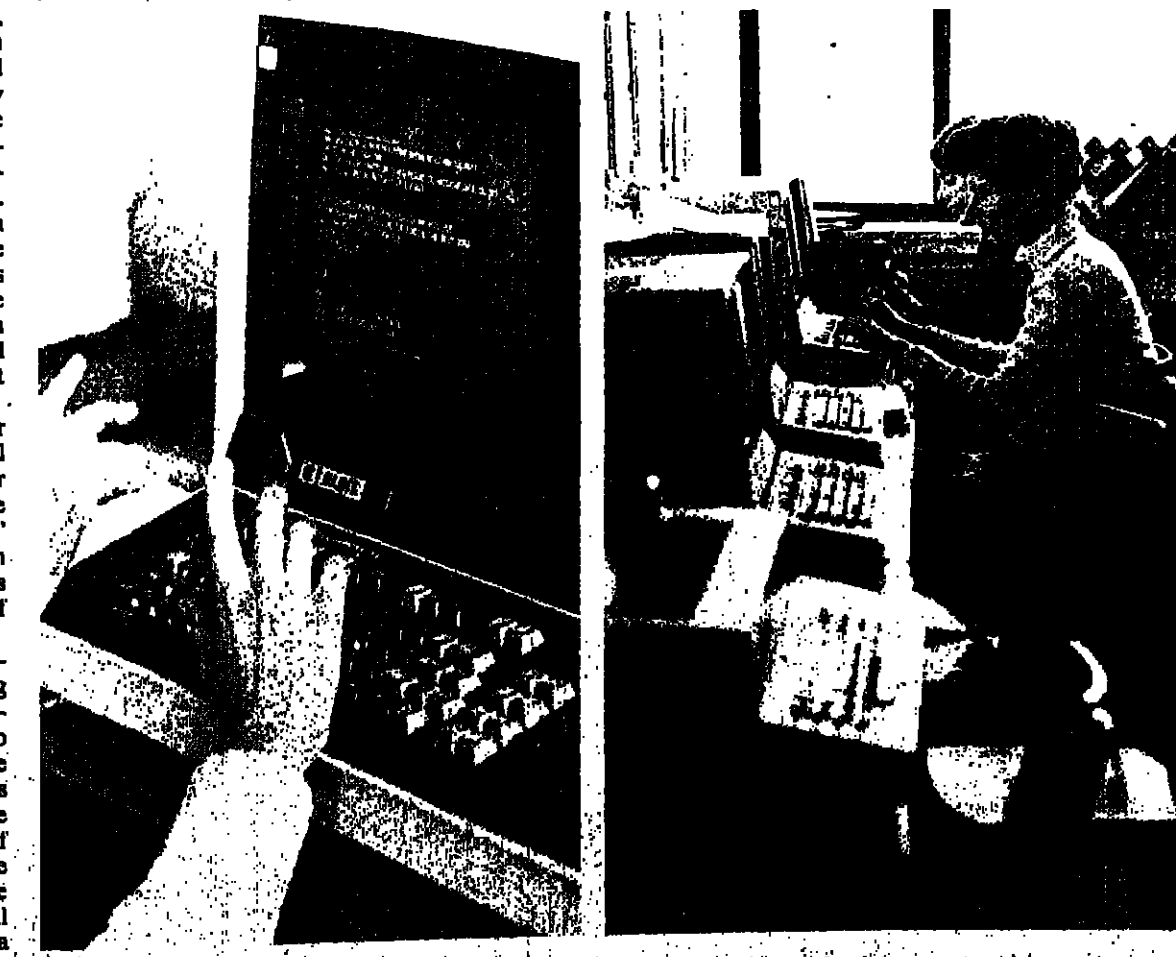
Computer students, says Isaac, who has an M.Sc. degree from the Hebrew University, require an above-average intelligence, leanings toward mathematics, self-discipline, patience and self-criticism. Four years ago, the Michlala bought a Digital PDP 11/34 computer with 20 terminals operating on a time-sharing basis. Servicing of the computers is "very expensive," he asserts, and the fee for an hour's computer time ranges up to \$50. But the Michlala believes that it is worth the expense.

Isaac, who also teaches at the Jerusalem College of Technology (an educational institution for religious men), finds sex differences in computer students' approach to courses. "The women don't want to conquer the machine, to find out exactly how it operates. They want to do a very good job with good supervision. But the men are always curious about how it works."

Very few of the computer students drop out, says Isaac, because they are selected very carefully before being admitted to the department. At the Michlala, as in Boys Town, students sit at the terminals at all hours of the day and until late at night, except, of course, on Shabbat.

"I was always interested in maths, and I thought that finding a job in the computer field would be easy," says Yehudit Meltzer, a 21-year-old Jerusalemite whose husband works full-time in a yeshiva. "Programming is interesting work, like solving crossword puzzles. But you have to keep up to date on the latest in developments." At the Michlala, computer students take 15 hours of computer courses a week, in addition to their Judaic courses. Meltzer also teaches computers at the Horev religious high school.

The Michlala expects to keep up with the technology by buying new equipment (its old punch-card IBM computer is out of date and made completely redundant by the Digital), including a computer that does graphics design in colour. In a few years, its graduates will be seen in schools, private companies and government computer operations around the country.



Student at Boys Town (above) practices what he prints, while Michlala students (below) let their fingers do the walking.

ISRAEL'S FARMERS are quickly catching up to their American counterparts in the use of computers, say local experts.

At present, the kibbutzim seem to be taking the lead in using computers in agriculture. Zvi Eckstein, manager of energy and industrial control at Motorola, says this is because of the growing sophistication and needs of kibbutzim. Motorola Israel is known worldwide for the computerization of irrigation systems as well as dairies and chicken coops.

In the latter, for instance, computers control everything from air temperature, to lighting, to feeding the chickens.

"We believe that when we give the farmer the optimal conditions (in computer equipment), he will save in energy and in chicken feed," says Eckstein. "On the other hand, this makes the chickens much happier and they lay more eggs."

Egg incubators, he adds, are being programmed to work at specific times at energy-saving temperatures and light levels which increase productivity.

## Egg box

Even chickens are being computerized, Israel's farmers tell Yitzhak Oked.

Computers have taken on an important role in the lives of kibbutz members as well. At Kibbutz Hamadiya, a central computer controls and keeps track of the consumption of electricity in the members' homes. The kibbutz expects to save about 15 per cent on electric bills which, in one year, will pay the \$20,000 it cost to buy and install its computer system.

In addition, kibbutz members tell the computer operator what their weekly work plans are and which hours they will be at home. He then programs the computer which, among other things, will turn on the hot water boiler (or air-conditioning unit) before the kibbutznik comes

home from work! Until now, people left on their boilers all day.

This computer system also enables the kibbutz secretariat to pinpoint where the most electricity is being used and thus enables it to reduce consumption.

Eckstein says that the kinds of computer systems Motorola uses are cheaper in Israel in maintenance and installation costs than abroad. A cable similar to a telephone line is usually installed around a kibbutz and the individual homes are connected to this network. In America, each computer control point in such a system costs between \$600 to \$800, as opposed to only \$250 here.

A sophisticated computer system is also being used, he explains, by the Mekorot water company to control the flow and distribution of water in the Arava settlements from the Dead to the Red Seas. As all settlements in the area are using Motorola units for irrigation, it will not be a problem to connect them to the main Mekorot system which will help in allocating water according to need.

"We plan to irrigate fields on Mondays, Wednesdays and Fridays between 6 and 9 p.m.," says Eckstein. "On the other days, it will be from 9 p.m. till midnight."

THE MEKOROT computer can file this information in its memory bank. This will ensure the availability of the proper pressure and amounts of water needed by settlements. It also saves money for Mekorot since the company will not be pumping water during hours that no one needs or uses it.

One of the companies that has had an important role in bringing computers to the farming community is Heshev, the inter-kibbutz

management service.

Meir Waxman, the marketing manager of the 20-year-old company, told *The Jerusalem Post* that Heshev supplies many agricultural (as well as industrial) organizations and settlements with computer software and other management services.

Foremost among Heshev's clients are the kibbutzim, he says, but with the introduction of the smaller "micro" computers, moshavniks are also jumping on the bandwagon.

One moshavnik farmer, who grows flowers for export to Holland, says his dream is one day to have a computer in his home that will tell him not only what the temperature is in his hot-house, but what the temperature will be in Holland.

As with others interviewed, the moshavnik says he would also like a computer to inform him on economic considerations, to reduce the risk involved in growing various products. Perhaps, he muses, the day is not far off when he will be told by his computer what the latest rate for carnations is in Europe.

## Patients are a virtue

Computers are revolutionizing the medical field, Joseph Morgenstern writes.

IN THE FIELD of medical technology there has been fruitful cooperation between Israel's research and development complex, the country's medical institutes and industry. This cooperation has led to major advances in medical technology and has turned the medical field into one of the most expanding high technology areas in modern Israel.

Some of the best known applications include the CAT Scanner, Elscint Ltd.'s work in this field has made the Haifa-based company the world's second largest supplier of CAT Scanners.

Israel's electronic medical application covers a broad range of applications including intensive care, coronary care, operating rooms, emergency units and other critical care applications. Through its wide range of products, the firm provides cost-effective monitoring and patient data management systems that satisfy the most demanding clinical needs. In addition to conventional monitors and monitoring systems, the company has developed a series of advanced micro computer supported products for critical care applications. Included in this range is the Solo Monitor, a unique microcomputer-based single patient system which combines vital sign monitoring with comprehensive clinical measurement capabilities, data analysis and 72-hour trends of vital signs. Solo is also manufactured as a special procedure unit which connects to any conventional patient monitor.

Elscint Ltd. has introduced the world's first family of computerized imagers where the digitally controlled detector communicates directly with an array of data acquisition and processing modules. The basic architecture of the APBX camera employs a new proprietary imaging computer, both as the electronic control system of the gamma camera and as the clinical data processor. The use of this computer in the system permits better linearity, uniformity and spatial resolution, resulting in improved images and more accurate quantitative information.

In the field of monitoring systems, micro computer based and modular single patient bedside monitors have been developed as well as portable adjustment modules suitable for continuous bedside monitoring. In addition, highly efficient multi patient multi parameter display units are available.

The leader in this field is Mennen Medical. The company designs patient manufacturing cardiovascular equipment. It has an international reputation for this innovative application of modern electro micro technology. Only recently, Mennen expanded its product line to produce implantable cardiac pacemakers.

Mennen Medical monitoring products are supplied to hospitals for intensive care, coronary care, operating rooms, emergency units and other critical care applications. Through its wide range of products, the firm provides cost-effective monitoring and patient data management systems that satisfy the most demanding clinical needs.

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System 2000 provides comprehensive and flexible monitoring for 4-32 patients. This microcomputer-based product enables physicians to monitor a variety of hemodynamic respiratory and arrhythmia parameters in coronary care and intensive care units. System 2000 provides advanced clinical data analysis with up to seven-day trends of vital signs, and can be economically expanded in stages to accommodate additional parameters and patients.

THE FACTORY of the future will probably not be heated in winter nor ventilated in summer. It will be badly lit and noisy. There will be no coffee breaks or holidays, but the "workers" won't mind because they will be robots.

The latest quake to hit the post-industrial age, robots are redefining the role of human beings in industry and setting new standards for production.

Worldwide, about 23,000 robots are in operation and their population increases by about 30 per cent a year.

Eventually they may drastically reduce the percentage of people engaged in industry in developed countries. A recent study indicates that by the year 2,000, about 10 per cent of working populations will be employed in industry.

Israel has been slow to get on the bandwagon, with a single robot in industrial use to date, but it is trying hard to catch up with the rest of the Western world.

"Robotics is a subject we decided we must begin investigating seriously," said Avraham Kalisky of the Office of the Chief Scientist at a packed seminar on robots recently organized by the National Institute of Technological Training.

Robots are so new that no one quite agrees on what they are. "What is a robot is a matter of taste," says Ya'acov Sadeh of Beta, a company involved in robot development.

The definition provided by the Robot Institute of America is only partially enlightening: A robot is a reprogrammable multi-function manipulator designed to move materials, parts, tools, or specialized devices through variable programmed motions for the performance of a variety of tasks.

Robots indicate a quantitative increase in flexibility over other automated systems. They are commonly characterized as having five or more degrees of freedom, joints and arms they can swivel, turn, bend down and raise up. This makes them useful not only for machine tooling, but also for transferring and loading materials.

They have been used most by the automobile industry, which absorbs 40 per cent of the world robot population, followed by the electromechanical industry.

Robots are likely to solve many problems for Israeli industrialists. They compensate for chronic shortages of manpower and are well-

## Robot power

Israel is trying hard to catch up with the rest of the world in the use of robots, Galina Vromen discovers.



Puma the new Technion robot, is examined by Prof. Roland Weill, head of the Technion's Robotics Centre at the faculty of mechanical engineering, and Prof. Elud Lenz, the university's vice-president for research.

geared to operating in medium-sized factories.

A survey of robotics prepared by Technion Prof. Roland Weill for the Ministry of Industry, noted that small countries, such as Norway and Finland, have strongly entered the field and could indicate the path Israel should take.

Israel Military Industries has been the first company to introduce robots in its production line. Its

productive labour, while a robot averages 95 per cent productivity, Halevi said.

IMI has found that robots are useful in about 160 spots in its factories and plans to begin introducing robots in many of these places in coming years, Halevi said.

Israel's robot population is expected to grow to several dozen this year and by several hundred next year.

Israel is anxious not only to begin using robots but also to develop them. The Chief Scientist's office in the Ministry of Industry has invested \$3m. promised over the next three years to fund an R and D project in robotics, according to Kalisky.

He noted that the government was also providing smaller sums for a number of other projects.

The Technion has invested in a Unimate-Puma robot for use in research and teaching. Investigators are interested in developing the robot so that it will be able to decipher subtle conditions in its environment with optical and auditory sensors.

Beta in Heersheva is launching a robot for production of clothes and shoes. "The Japanese have not developed robots for the textile industry. They moved into fields where production is tremendous. Textiles has a slightly smaller market and is technically more complex," explained Sadeh of Beta, the company's engineering and development department.

Japan and the U.S. have led the world in tackling the problems of robotic manipulations. But Beta estimates it can gain an edge in developing robots to handle non-rigid materials such as textiles, Sadeh said.

The company expects to have a prototype robot ready in about two years with four to six degrees of freedom that will use vision sensors to manipulate textiles.

An arc welding robot with optical sensors to track welding seams is being developed by Elcotech's robotics division. A Ramat Gan firm with experience in micro-computer software and hardware, Elcotech is also aiming for a prototype in two years.

"A lot of hard engineering in robotics has already been done by others. We're moving into second generation robotics with more sophisticated sensors," said Gideon Gelman, head of the firm.

Gelman believes Israel's advanced knowledge of optical

engineering will help it beat foreign competition in developing sophisticated computer sensors.

Elcotech plans to launch improvements on to existing robots in the first stages of development before attempting a start-to-finish robot of its own.

The Elcotech robot will be able to identify metal parts, position them correctly and then weld the pieces, Gelman predicts.

"A lot of time gets wasted today getting the metal parts into the right position for the robot to begin working on it," he said.

Israel's emerald industry, which boasts of being the most mechanized in the world, plans to incorporate robots in parts of the cutting and polishing process within the next two years.

Kibbutzim have taken an interest in robots, viewing mechanization as a solution to the ideological discomfort of hiring outside labour.

"Robots and kibbutzim were made for each other," says Azriel Perets, in charge of setting up a robotics engineering centre at the Rupin Academy for agriculture to teach kibbutzniks how to program and maintain robots.

"Kibbutzim have always had a labour shortage, jobs in kibbutz industries can be tedious and this has worried us. Robots could also mean that kibbutz factories will be able to work more than the maximum two shifts members have agreed to work so far," he said.

Like private industry kibbutzim may eventually produce their own robots or manufacture robotics components.

Trying to overcome its 10 year lag behind Japan and the U.S., Israel is likely to push its research and development in this field towards systems with improved performance.

In his conclusions, Weill indicated that Israel cannot undertake research in all areas of robotics at once. A better approach will be to find specific areas which are still open and which have a high potential for future improvements, like software and sensors.

Halevi believes robotics is just in its infancy worldwide. "In a few years, maybe it will reach bar mitzva intelligence," he quipped.

"Man remains the most flexible worker, best able to compensate for any unexpected change in the environment," Halevi said.

But robotics is winning out for efficiency and reliability in many industrial jobs.

## Official business

Big Brother is watching you while you work, writes Greer Fay Cashman.

conference-call telephone with memory bank which eliminated the frustrations of long-time busy signals, and the photo-copying machine which saved untold hours of retyping when a secretary forgot to insert the correct number of carbon sheets in the typewriter, or the office needed copies of written or printed information.

Photo-copying machines were among the many types of sophisticated office equipment displayed recently in Tel Aviv by CTS, an Israeli company which sells chemicals and technological equipment. Included were small, comparatively lightweight, and large, heavy-duty copiers, all of which seemed rather commonplace

among the future basics such as microfilm and microfiche readers, and printers with square and rectangular screens of different sizes.

In professional terminology, these screens are referred to as vertical and horizontal, but these are misnomers, as either screen is suitable for both vertical and horizontal data. The needs of the travelling business executive have also been taken into account: a portable microfiche reader was shown which folds up neatly into a small, compartmentalized attache case.

BUT THAT'S not all the executive traveller carts around with him these days. There's also the pocket-size dictaphone for aural memos and dictation en route, and the por-

table beeper which enables non-stop communication between executive and office.

Neither of these two items was part of the CTS display, but there was another compact and convenient self-contained unit which makes it possible for the travelling salesman to show all his merchandise — and explain how to use it — without the strain of haulage. This invention confirms that audio-visual aids to sales are no longer confined to cinema and television commercials. CTS is selling a Bell & Howell-produced compact sound-slide projector as a portable unit. It can be used for desk-top presentation in daylight, or can be set up as a conventional projector in a darkened room, throwing a large and clear picture on a screen.

The unit looks like a small television set, and in fact combines two projectors into one unit, giving the salesman the flexibility of screening his programme to large and small audiences, without having to change equipment on account of the size of the room. This kind of equipment is also a learning device, and can for instance demonstrate to the viewer the best and easiest way in which to put together some complicated type of machinery. A "pause" button enables the viewer to hold any one picture on the screen indefinitely.

High-technology and computerized systems have become part of our life-style at home, in the office and at school. Our lives are virtually controlled by electronics. Why bother to write a letter when you can send a cassette tape? Why bother to read an instruction manual when you can use a sound-slide projector?

George Orwell's image of 1984 is almost upon us. Existing, time-saving inventions in the field of electronics may ease the work-load and increase efficiency. But will it all go so far that Orwell's frightening prediction that "Big Brother is watching you" will come true?

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"GOOD morning dear librarian,  
I am Alef who is leading you into the  
future.

This is a complicated system  
That was built to save effort."

So goes the poem (in Hebrew)  
composed especially for the  
librarians using the five-month-old  
computer catalogue in the Hebrew  
University library on Mount  
Scopus. From the many smaller  
libraries with complicated  
catalogues which were at the old  
Givat Ram campus, Alef has  
managed to efficiently store all the  
information needed to run a much

## Page boy

Tony Kutner meets Alef, the  
amiable Hebrew U. library computer.

larger one with over 300,000 books,  
Yona Metzger, whose job it is to  
make sure that readers are able to  
use the system properly, says that  
"people are sometimes afraid of it,  
especially older people who are set  
in their ways."

But for the more adaptable stu-  
dent, Alef can be a lot of fun and  
many people like to come to the

library to play. Sitting before the  
screens which display the informa-  
tion required they press buttons to  
their heart's content while queues  
form behind them.

The system does take some un-  
derstanding and counsellors have  
been hired from the student body to  
provide advice. Metzger says that  
many of the students regard using  
the computer with the same ap-  
prehension as before a dental visit.

"Someone came to me one day,  
shaking. He didn't know how to  
make the computer work and it was  
all a little too much for him. Other  
people sit in front of the screen,  
waiting for something to happen. If  
they don't press the 'carriage  
return' button, they might as well  
wait for the mashiah."

Metzger is developing a training  
programme for users to avoid such  
problems.

Alef may not bite, but does do  
almost everything else. It stores  
eight catalogues which could never  
be done with cards, and immedi-  
ately updates information as soon as it  
is fed in. Information disseminated  
about a particular book includes the  
number of copies in the library, its  
author and publisher, the length of  
the book and a brief summary of the  
topics covered. Soon the system will  
state whether the book is on the  
shelves or in storage. If the desired  
work is out on loan, Alef says that  
too and provides the information  
when it is expected back. Then it is  
a simple matter to have the book  
reserved.

The old library catalogues utilised  
the old Dewey system which used a  
scale from 0-1000 and was supposed  
to represent the sum of human  
knowledge. But the Hebrew  
University library staff discovered  
that Alef is better suited to the U.S.  
Library of Congress classification  
system which is easily kept up to  
date. The university has its own "in-  
house" computer programme which  
is well suited to its needs and could  
be easily expanded to include any  
other universities into the system.



Student uses the Hebrew U. library  
computer. (Richard Nowitz)

Should this happen, Alef will be  
able to give the whereabouts of  
books in other universities, too.

Alef, whose terminals were made  
by Elbit (the computer itself is by  
Controlled Data Corporation) seems  
almost human to the library  
workers. He can speak two  
languages — English/Hebrew —  
and recite poetry. Since Alef came  
along, life has become much easier  
for the librarians — except when  
Alef is in a bad mood: sometimes it  
works better than other times and  
has been known to cut off abruptly  
at the end of its work, as if it felt in  
need of a rest.

(The library is open to students  
from 9 a.m. to 7 p.m.)

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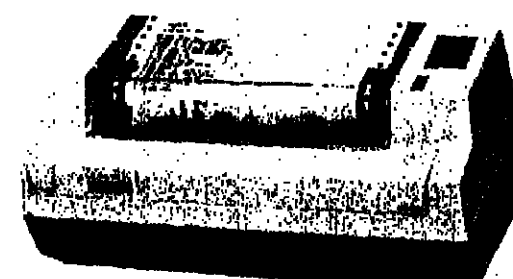
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## Room service

Services will get better with computerized  
hotel transactions, Tel Aviv Hilton Hotel manager  
Dieter Huckestein tells Michal Yudelman.

**HOTEL KEYS** will soon become a  
thing of the past, together with  
hand-planned menus and in-  
dividually written out customer ac-  
counts, as international hotels enter  
the computer age.

But personal service will not be  
thrown out with the manual  
procedures, promises Tel Aviv  
Hilton general manager Dieter  
Huckestein. In fact, he says that  
computers will be used to improve  
the hotel's services.

The Hilton has a computer which  
recognizes the hotel's 12,000 return-  
ing guests — those who stay there  
more than three times a year — and  
remembers each guest's whims and  
desires.

For instance, if a guest prefers  
sun during the afternoon hours or a  
view of the sea, the computer  
produces these data as soon as the  
reservation comes in and helps find  
a suitable room.

The hotel is also going over to a  
computerized card system whereby  
guests enter their rooms by using  
coded cards instead of keys. This  
system will facilitate the check-in  
process and will increase security:  
the card does not indicate the  
guest's room number and thus dis-

courages entry by other persons.  
THE HILTON's executive business  
lounge, according to Huckestein,  
will soon become — with the help of  
computers — a small business  
centre, providing information about  
foreign currencies, commodities,  
economic events, and "who's who"  
in Israeli industry. This is expected  
to be extremely useful to people  
conducting business, who comprise  
some 60 per cent of the guests who  
stay at the hotel.

"The services provided here will  
be unique in the Israeli hotel in-  
dustry and we hope they will en-  
courage business transactions from  
here," Huckestein says.

The hotel's menu preparation,  
workers' pay slips, reservation  
procedures and all other accounts  
will be fully computerized by next  
year, increasing efficiency and  
enabling immediate booking in  
other Hilton hotels.

The hotel's next step is linking the  
television set in each room to the  
computer, which will allow guests  
anything from ordering sandwiches  
at 2 a.m. to surveying the situation  
on the New York Stock Exchange  
by pressing the appropriate button  
on their television sets.

## From Aaron to abortion

Bar-Ilan's Responsa  
archives are tackling the  
problems of adapting  
Hebrew for computer use,  
Galina Vromen reports.

COMPUTERS, we know, can do  
wonderful things. But can they be  
programmed to understand  
Hebrew? It is no wonder that they  
are bogged by the Hebrew  
language where the average word  
has four different meanings.  
Including prepositional prefixes, a  
verb root in all its possible varia-  
tions has about 20,000 different  
forms, while a noun may have as  
many as 2,000.

"Ambiguity in meaning is a  
problem in every language, but it is  
much more acute in Hebrew and  
Arabic," notes Professor Ya'akov  
Choueka of Bar-Ilan University's  
Institute for Information Retrieval  
and Computational Linguistics.

Discovering ways of "teaching"  
computers to understand Hebrew is  
crucial to the success of full-text  
retrieval systems such as the com-  
puterized Responsa archives at Bar-  
Ilan.

The Responsa system has stored  
in its computer memory 176 collec-  
tions of rabbinic commentaries  
from the 8th Century to the present  
day. This makes it an invaluable  
storehouse of information for  
historians, rabbis and legal experts.

But if a researcher wants to find  
out what the ancient sages had to  
say about the moon, and asks the  
system to retrieve all references to  
"levana" (one of several terms for  
"moon" in Hebrew), he or she will  
get a tremendous amount of irrele-  
vant material. Along with every  
reference to levana as "moon," is a  
list of other definitions and  
references to the word including all  
feminine singular adjectives refer-  
ring to "white," and every reference  
to "brick," "he cleansed it," and "it  
was cleansed," because they are all  
written with exactly the same let-  
ters.

A researcher looking for  
Responsa references to abortion  
and pregnancy once ended up with  
every reference to the name Aaron,  
because the same letters also spell  
"I will be pregnant with them."

The Responsa project is the only  
large full-text retrieval system in  
Hebrew, but the development and  
use of similar systems is likely to in-  
crease.

Newspaper archives, national  
documentation centres and libraries  
are likely to find a computerized  
full-text retrieval system a vast  
improvement over a traditional in-  
dex. Full-text computer systems are  
much more flexible than other in-  
formation systems. They allow the  
user to define the subject and, in ef-  
fect, to create his own index, rather  
than to depend on a pre-determined  
index.

UNLESS COMPUTERS can learn to  
decipher the exact meaning and  
context of words, these full-text  
systems will be problematic in  
Hebrew.

Computer specialists at Bar-Ilan  
are trying to reconcile these  
problems by approaching the  
problem from three directions.  
Perhaps, they say, if they can  
programme the computer with

Hebrew grammar rules, it will be  
able to ferret out words that syntac-  
tically don't comply to the user's  
needs. One could ask for levana  
(moon) and specify "noun." If the  
computer learns to distinguish the  
parts of speech in Hebrew, some  
ambiguity could be avoided.

Another approach is to try and

teach the computer to figure out  
semantically the subject being dis-  
cussed in a text. If a researcher asks  
for levana and specifies "heavenly  
body," the computer may learn to  
pick out levana as moon, when a  
reference concerns constellations,  
weather, or periodicity.

Theoretically, when the same let-

ters appear surrounded by  
references to family or inheritance,  
the computer would give the user  
a selection of references.

Finally, computer specialists may  
use a combination of these systems.  
The computer could be program-

med to assess the meaning of sur-  
rounding words syntactically and  
semantically before giving the user  
a selection of references.

"It is interesting how easily  
human beings can figure out the  
context and how difficult it is to ex-  
plain the process to a computer,"  
says Choueka.

## ENCOUNTERS WITH BANKING OF A NEW KIND



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THE COMPLEXION of the computer industry worldwide is changing significantly and rapidly.

In 1975, the big mainframe manufacturers — led by IBM, Honeywell, Burroughs, Control Data, Honeywell and Sperry Univac — accounted for some 83 per cent of U.S. manufacturers' \$12.8 billion shipments. Mini-computers, small business computers and office word-processors accounted for only 17 per cent of the total.

By 1980, the proportions had altered and mini-computers, small business and desktop computers accounted for not less than 40 per cent of the \$28.7b. of U.S. shipments. The market to be held by mini- and micro-computers manufacturers is estimated to rise to about two-thirds of a total of more than \$63b. in 1985.

Why such a surge in sales of the mighty mini-computers? The basic shift is primarily due to the fact that smaller computers have become powerful enough to do many of the jobs that only the big mainframe systems were able to accomplish in the past.

## Mighty mini

Micro-computers for business, industry and science are the basis for Mega-Byte's growth, Joseph Morgenstern reports.

Two years ago, Mega-Byte Computers Ltd. entered the mini- and micro-computer field at the time when the Israeli market was still in its early stages, by becoming a representative in Israel for several American computer companies. These included: Ohio Scientific, Western Dynex and California Computers System.

The ability to provide micro-computers for business, industry and science was the basis for Mega-Byte's rapid growth and the offices of the company, originally in the prestigious Tel Aviv Asia House had to be moved to larger headquarters in Ramat Gan. The company's headquarters include a service department as well as a computer software department.

An opportunity for further growth presented itself when Mega-Byte entered into a representation agreement with the largest Hong Kong-based micro-computer manufacturer, EACA International Ltd. Mega-Byte began to represent EACA for Israel and Egypt. EACA, whose annual sales are in the order of \$1b., produces a line of micro-computers under the Genie trademark, which are fully compatible with the American Radio Shack. The Genie business computer systems consists of a central processing unit — the heart of the computer — a monitor which is the display unit, floppy disk-drives for programme and data storage, and a printer.

The Genie micro-computer

system is highly cost-effective and its FOB Hong Kong price of \$1,800 competes with American units which cost much more in terms of quality and end-user possibilities. Because of the low price, more than 50 units are being sold in Israel.

Towards the end of 1981, during an extended visit to Israel by David Ho, EACA's international sales manager, an agreement was worked out whereby Mega-Byte will enter into the assembly of the Genie systems in Israel. The plan calls for the setting up of a plant which will assemble 10,000 systems a year, of which 8,000 will be for export, the balance intended for the Israeli market.

The company will also be marketing the Genie line in Europe, Egypt and in South America. Any product which is produced in Israel and contains 35 per cent or higher of added value can enter into the European Common Market countries free of duty costs.

Within a year Mega-Byte hopes to have completed an assembly plant in a development community. Some 100 workers will be employed.

TWO new micro-computers, one at each end of the micro-computer spectrum, have been put on the market by the Binar company, Israeli representatives of Comadore.

VIC-20 can be hooked up to a home TV receiver, used to control TV colour and sound, and comes with a variety of computer facilities, including compatibility with peripherals. It can be used as a terminal for other computers, and also offers a broad range of TV games.

The second is the Super Pet 9000, which was developed at Waterloo University, Canada, and has been called the programmer's delight because of the large number of high level languages that can be used with it, and its great editing and sifting possibilities, which facilitate its use with large computers (IBM, PDP).

For the local market, Mega-Byte — through its affiliates — will offer total software support, and for those customers who do not have the means to purchase the Genie outright, it will offer it on a lease-sale basis.

## Computer whizz-kid

A former gifted child, Scitex's president is helping other such children, says Lou Blattner.

EFRAIM ARAZI was a gifted child. A computer whizz-kid who dropped out of high school but managed to make his way into MIT, Arazi's fascination for electronics components in his youth drove him to daring exploits and his parents to despair.

Arazi is the founder and president of one of the most successful high-technology firms in Israel today. The Scitex Corporation, Ltd., headquarters in Herzliya, is a leading exporter of computer systems.

In spite of his meteoric rise to success, Arazi has not forgotten his childhood. He believes that gifted children of the last generation should give support to their successors. In fact, he recently opened his company stock-room to representatives of the Young Persons' Institute for the Promotion of Art and Science. Some \$10,000 worth of electronics components for use by children under the age of 15 were donated to the centre, located near Tel Aviv University, by Scitex.

"In high technology, the product perishes every three years," says Arazi, hinting that plenty of other Israeli companies may also have items to spare. The equipment given by Scitex will be used in courses in computer science, robotics, electronics and automation.

Some of the gifted children who use these devices may end up pursuing careers at Scitex, where the staff is made up mainly of scientists, engineers and technicians — experts in such fields as electro-optics, computer design, systems engineering, image-scanning and software.

Scitex's computer-aided design (CAD) systems use a full-colour format for pictorial image and graphic applications. These systems automate the pre-press stage in commercial colour graphics reproduction, for printing materials, catalogues, advertising materials, maps, etc.

To printers and publishers, "pre-press" has traditionally been a collective term for a series of highly specialized and time-consuming manual tasks. Each page involves colour separation, retouching, strip-

ping, rephotographing, etc. Scitex's Response 300 has revolutionized pre-press, transforming it into a single, flexible and stream-lined process by using digital computers, colour video screens and laser cutters. And it does all this in a fraction of today's conventional turnaround time.

The Response 300 connects with the sort of scanner most shops already have. A high-speed mini-computer receives the process copy and line art from the scanner through a special interface. The system can take in all the colours simultaneously or one separation colour per scan — according to the scanner's own capabilities.

Among Scitex's customers are Gutenberg Bladene of Copenhagen, Denmark, a major publisher/printer of magazines and comics; Dai-Nippon Printing of Tokyo, the largest commercial printer in Japan; and Kummerly & Frey, Ltd. of Bern, Switzerland, one of Europe's largest privately owned map publishers.

In the U.S., customers include R.R. Donnelley & Sons, Co., America's largest commercial printer; Meredith/Burda of Lynchburg, Va., a major magazine publisher; and Parade Publications of Pennsylvania.

Scitex not only markets its products internationally, but maintains a highly trained professional staff for sales and product support in all major markets.

About six months ago, the Scitex America Corporation, a subsidiary of Scitex, introduced several new products for colour page-assembly. These included an advanced imager colour console high-resolution laser display, and a new high-speed laser output unit. Orders were received immediately, signalling — as management pointed out — the course of progress for computer graphics systems in the future.

Last month, Scitex announced that unaudited sales for the fourth quarter of 1981 and for the full year were at record levels. For the entire twelve months, sales were about \$35 million, up from \$23.8m. in 1980.

## No body's business

Computers are getting into the office action, reports Yitzhak Oked.

SMALL-SIZED personal computers are making their way into homes and businesses all over the world and, as of late, into many Israeli households and offices.

In the past five years, manufacturers of these micro-computers in the U.S. have watched sales in their industry boom from zero to about \$1 billion a year. When compared to America on a per business basis, Israel is right on par. Homeowners here, however, are not buying up their own computers to help with family budget or business affairs like their counterparts abroad.

Jack S. Dunietz, one of the managing directors of the Mashov company which imports and markets computer systems, explains the small computer situation in Israel. Israelis are slow to adapt to the "personal computer revolution" simply because of prices. The personal computer costs them about twice as much as it costs people in the U.S. This is due to mark-up, transportation, taxes, etc.

But, Dunietz says, business in this field is picking up here all the time. "It's gotten to such a situation that lately our company has been

wasting time persuading people not to buy micro-computers."

He explains that many people in the business community hear about the wonders of this modern "genie," and want to try it out.

Some years ago in Israel, the computer revolution in the business sector began with big companies buying large systems for millions of dollars, he explains. Government departments, service bureaux and banks, too, bought what is called "batch" data processing computers, operating "on-line" — receiving information at regular intervals.

THE NEXT phase of the revolution came with the introduction of mini-computers selling at more than \$100,000 each. These computers were bought by companies using larger computers and, at this price, slightly smaller companies began to buy as well.

But the real breakthrough, according to Dunietz, came about five years ago when micro-computers appeared on the market, and medium-sized and small businesses could suddenly afford a computer.

"The average business computer in this field could be bought for about \$20,000 or by leasing it for about \$300 to \$400 per month," he says.

"These small computers have given a big push to the small businessman. It is like giving a person artificial respiration — he can suddenly breathe again. This is because the small businessman usually doesn't know very much about financial management, inventory control and bookkeeping.

All of Mashov's equipment is sold with an option that buyers can resell it to the company within six months. There is a rental charge of 2 per cent of the price of the computer per month.

The company also operates a demonstration and training centre, so that interested people can learn first how to use the equipment before buying it.

The company also has 12 programmers that are capable of adapting computer programmes to make them suitable for each customer, according to his specific needs.

## Getting into training

The first job is most important, lecturer Yehuda Freed tells Judith Weil.

"I ENJOY my work and I enjoy teaching. However, I think that many courses are too much like university — they give people knowledge, but not a profession. Computing is in many ways more of an art than a science. A person needs to work for about six months before he begins to be useful. After that he's, of course, still learning all the time. Where I work people are not normally accepted unless they have five years' experience."

Yehuda Freed is a systems analyst, who has worked in the computer field for about 15 years. Freed has also lectured in about 50 courses in programming, systems analysis and other computer-related subjects.

"Computing is an expanding field — there will always be computing jobs. When the financial situation is bad, efficiency becomes very important.

"Each week there are about 20 advertisements in the newspapers for programmers. If a person has experience it's easy to get a job. But getting the first job is hard. One can usually get it if a firm desperately needs people, if one signs a long-term contract, through the backdoor (by starting off as a typist or an operator), or with *protekala*. Some people are prepared to work for nothing in order to get that all-important first job.

"Many people are afraid of computers, but they are really just machines, like a washing-machine or a fridge."

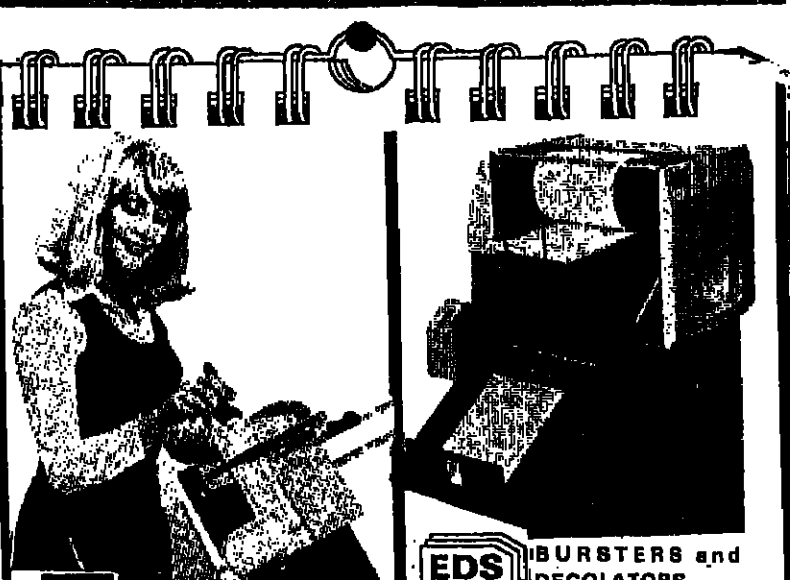
Freed would advise anyone who has an aptitude for the work and is considering a career in computing to go ahead. "It's important for a computer worker to be good, otherwise he can do a lot of harm. Occasionally, programmers suffer from what we call 'the brilliant high-school student syndrome' — people

who guard against every contingency to the extent that they never get finished.

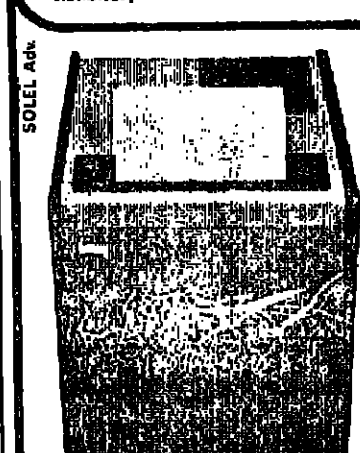
"Here in Israel, the standard of work is as good as in the U.S. and better than in Europe. We are already exporting software and I think this trend will continue. I expect that in another generation, computing will be a standard school subject.

"As a systems analyst, I do very

little direct work on the screen. My job is to meet with the client, learn his job and his requirements and decide what's the best type of programme for him. I meet lots of interesting people and have to know my client's job — or at least the part I'm dealing with — as well as he does. A computer is just a machine, but for me computing has only a little to do with machines and a lot to do with people."



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